AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

1. (Currently amended) A computer program product, tangibly embodied on a machine-readable storage device, the computer program product comprising instructions operable to cause a data processing apparatus to perform a method, the method ~~operations~~ comprising:

displaying a user interface in a client program, the user interface having a plurality of ~~controls~~ user interface elements, the plurality of user interface elements ~~plurality of controls including multiple types of controls, each control of the plurality of controls~~ having ~~a state and a control~~ data ~~structure~~ structures indicating, ~~wherein each control data structure corresponds to one control, and wherein the state of each control includes~~ a data state corresponding to data content of the plurality of user interface elements and a view state corresponding to a visual configuration of the plurality of user interface elements;

~~for each control in the plurality of controls,~~ storing the data state and the view state of at least one of the user interface elements ~~control~~ as a first state for the at least one user interface element ~~control~~ in ~~the control~~ a data structure corresponding to the ~~control~~ at least one user interface element;

receiving ~~first~~ user input from a user comprising a ~~first~~ change to the data state and the view state of the at least one user interface element ~~a first control in the plurality of controls~~;

updating the data state and the view state of the ~~first control~~ at least one user interface element based on the ~~first~~ user input;

storing the updated data state and view state of the ~~first control~~ at least one user interface element as a second state for the at least one user interface element ~~first~~ control in the ~~control~~ data structure corresponding to the first user interface element ~~control~~;

receiving undo scope setting information associated with the at least one user interface element ~~second input from the user comprising a second change to the state of a second control in the plurality of controls~~;

~~updating the state of the second control based on the second user input;~~

~~storing the updated state of the second control as a second state for the second control in the control data structure corresponding to the second control;~~

receiving ~~third~~ user input from a user comprising a request to undo the ~~first~~ change to the at least one user interface element ~~first control~~;

determining whether the undo scope setting information indicates ~~first change affects~~ the data state, the view state, or both the data state and the view state ~~of the first control~~;

when the undo scope setting information is determined to indicate the data state, performing the undo request by restoring only the data state of the at least one user

interface element to reflect ~~determining whether~~ the first ~~change affects the view~~ state ~~of the first control~~;

when the undo scope setting information is determined to indicate the view state, performing the undo request by restoring only the view state of the at least one user interface element ~~first control~~ to reflect the first state ~~for the first control without affecting the state of the second control~~;

~~transmitting the restored state of the first control to a server;~~ and

when the undo scope setting information is determined to indicate both the data state and the view state, performing the undo operation by restoring both the data ~~clearing the stored first~~ state ~~for the first control and the stored second~~ and the view state for the at least one user interface element ~~first control from the control data structure corresponding~~ to reflect the first state ~~control without affecting the control data structure corresponding to the second control~~.

2. (Currently amended) The computer program product of claim 1, wherein the plurality of user interface elements ~~multiple types of controls~~ include one or more ~~of a~~ text field elements ~~control type~~, [[a]] radio button ~~control type~~ elements, [[a]] table ~~control type~~ elements, [[a]] tray ~~control type~~ elements, and [[a]] menu elements ~~control type~~.

3. (Canceled)

4. (Currently amended) The computer program product of claim 1, wherein the ~~operations~~ method further ~~comprise~~ comprises:

receiving ~~fourth~~ user input from a user comprising a request to redo the ~~first~~ change to the ~~first control~~ at least one user interface element; and

performing the redo request by restoring the data state and the view state of the ~~first control~~ at least one user interface element to reflect the second state ~~for the first control~~.

5. (Currently amended) The computer program product of claim 1, wherein the ~~third~~ user input comprising the request to undo the ~~first~~ change to the at least one user interface element is received while input focus is not on the at least one user interface element ~~first control~~.

6. (Currently amended) The computer program product of claim 1, wherein the undo scope setting information further indicates a second user interface element of plurality of user interface elements that is associated with the at least one user interface element, and

the method further includes performing the undo request by restoring ~~the~~ a state of the second user interface element in addition to ~~first control includes~~ restoring [[a]] the state of the at least one user interface element ~~another control that shares data with the first control~~.

7. (Canceled)

8. (Canceled)

9. (Currently amended) A computer program product, tangibly embodied on a machine-readable storage device, the computer program product comprising instructions operable to cause a data processing apparatus to perform ~~operations~~ a method, the method comprising:

generating a plurality of data structures that store application data and associations between the application data and a plurality user interface elements associated with the ~~of~~ application ~~controls~~, the user interface elements having ~~wherein each application control of the plurality of application controls has a state and~~ a ~~control~~ data ~~structure~~ structures indicating, ~~wherein each control data structure corresponds to one application control of the plurality of application controls, wherein the state of each application control of the plurality of application controls includes~~ a data state corresponding to data content of the user interface elements and a view state corresponding to a visual configuration of the user interface elements, ~~and~~ wherein ~~each application control of the plurality of application controls is~~ the user interface elements are rendered based on the application data;

detecting that the data state and the view state of a first ~~application control~~ user interface element of the plurality of ~~application controls~~ user interface elements has changed from ~~a first prior~~ an initial state to a ~~first~~ new state;

~~determining whether the change affects the data state of the first application control;~~

~~determining whether the change affects the view state of the first application control;~~

recording~~, for the first application control,~~ the ~~first prior~~ initial state of the first user interface element ~~first application control~~ in a ~~the corresponding~~ data structure associated with the first user interface element;

~~updating, for the first application control, the corresponding data structure of the plurality of data structures based on the first new state;~~

~~detecting that a second application control of the plurality of application controls has changed from a second prior state to a second new state;~~

recording~~, for the second application control,~~ the ~~second prior~~ new state of the first user interface element ~~second application control~~ in the ~~corresponding~~ data structure associated with the first user interface element;

~~updating, for the second application control, the corresponding data structure of the plurality of data structures based on the second new state;~~

receiving undo scope setting information associated with the first user interface element;

receiving user input from a user requesting that an undo operation be performed on the first user interface element ~~application control~~;

determining whether the undo scope setting information indicates the data state, the view state, or both the data state and the view state;

when the undo scope setting information indicates the data state, performing the undo operation by restoring only the data state of the first ~~application control~~ user

interface element to the ~~first prior~~ initial state ~~without affecting the state of the second application control~~;

when the undo scope setting information indicates the view state, performing the undo operation by restoring only ~~updating, for the first application control,~~ the ~~corresponding data structure~~ view state of the ~~plurality of data structures based on~~ first user interface element to the ~~first prior~~ initial state; and

when the undo scope setting information indicates both the data state and the view state, restoring both the data state and the view state of ~~transmitting~~ the ~~restored~~ first user interface element to the initial ~~prior~~ state ~~of the first application control to a server; and~~

~~clearing, for the first application control, the stored application data in the corresponding data structure of the plurality of data structures without affecting the data structure corresponding to the second application control~~.

10. (Currently amended) The computer program product of claim 9, wherein ~~at least one data structure of~~ the ~~plurality of~~ data structures ~~is~~ comprise at least one data tree.

11. (Currently amended) The computer program product of claim 9, wherein ~~at least one data structure of~~ the ~~plurality of~~ data structures ~~is~~ are stored on a client device.

12. (Currently amended) The computer program product of claim 9, wherein the plurality of ~~application controls include~~ user interface elements includes multiple types of ~~controls~~ user interface elements.

13. (Currently amended) The computer program product of claim 9, wherein the associations between the application data and the plurality of ~~application controls~~ user interface element are defined by metadata.

14. (Currently amended) An apparatus comprising:

means for displaying a user interface in a client program, the user interface having a plurality of ~~controls~~ user interface elements, the plurality of ~~controls~~ user interface elements ~~including multiple types of controls, each control~~ having ~~a state and a control~~ data ~~structure~~ structures indicating~~, wherein each control data structure corresponds to one control, and wherein the state of the control includes~~ a data state corresponding to data content of the user interface elements and a view state corresponding to a visual configuration of the user interface elements;

means for storing, in a data structure associated with a first user interface element of the plurality of user interface elements, the data state and the view state of the first user interface element as a first state for the user interface element;

means for receiving ~~first~~ user input from a user comprising a ~~first~~ change to the data state and the view state of the first user interface element ~~control in the plurality of controls~~;

means for updating the changed data state and view state of the first ~~control~~ user interface element based on the ~~first~~ user input;

means for storing the updated data state and view state of the first ~~control~~ user interface element as a second state for the first user interface element ~~control~~ in the ~~first control~~ data structure associated with the first user interface element;

means for receiving undo scope setting information associated with the first user interface element ~~second input from the user comprising a second change to the state of a second control~~;

~~means for updating the state of the second control based on the second user input;~~

~~means for storing the updated state of the second control as a second state for the second control in a second control data structure;~~

means for receiving ~~third~~ user input from a user comprising a request to undo the ~~first~~ change to the first user interface element;

means for determining whether the undo scope setting information indicates ~~first change affects~~ the data state, the view state, or both the data state and the view state ~~of the first control~~;

means for, when it is determined that the undo scope setting information indicates ~~determining whether the first change affects~~ the ~~view~~ data state, performing the undo request by restoring only the data state of the first ~~control~~ user interface element to reflect the first state;

means for, when it is determined that the undo scope setting information indicates the view state, performing the undo request by restoring only the view state of

the first ~~control~~ user interface element to reflect the first state ~~for the first control without affecting the state of the second control~~;

~~means for transmitting the restored state of the first control to a server;~~ and

means for, when it is determined that the undo scope setting information indicates both the data state and the view state, performing the undo request by restoring both ~~clearing~~ the ~~stored first~~ data state ~~for the first control~~ and the ~~stored second~~ view state ~~for~~ of the first user interface element ~~control from the first control data structure corresponding~~ to reflect the first state ~~control without affecting the second control data structure corresponding to the second control~~.